INSTRUCTION MANUAL

FT-7

YAESU MUSEN CO., LTD.

TOKYO JAPAN

HF MOBILE TRANSCEIVER
FT-7



The all-solid-state FT-7 mobile transceiver provides high performance on the 80 through 10 meter bands. The operator may select upper or lower sideband (USB, LSB) or CW operation, and the compact package contains many features engineered for maximum convenience during mobile operation.

The TUNE control provides single-knob peaking of all transceiver circuits, thus eliminating inconvenient plate and load controls. Transmitter final amplifier input power is 20 watts DC. A high performance noise blanker minimizes impulse-type noise such as that commonly found in mobile applications. Also built-in are a 100 kHz crystal calibrator and receiver offset tuning (clarifier). For CW operation, semi-break-in with sidetone is provided.

The receiver front end utilizes MOS FET and Schottky diode circuitry for maximum sensitivity and immunity from overload.

The operator may select between either the internal VFO or a fixed (crystal controlled) channel. An external VFO may be used with the FT-7 to provide either VFO or crystal control of the transmit and/or receive frequency.

The FT-7 operates directly from a 13.5 VDC power source. For base station operation, the FP-7 or FP-4 power supply may be used to provide the necessary voltage.

In order to derive the maximum satisfaction from your new FT-7, we recommend that you read this instruction manual thoroughly so as to understand fully the functions of the controls and switches.

SPECIFICATIONS

Frequency coverage:	80m	3.5-4.0	MHz
	40m	7.0-7.5	MHz
	20m	14.0-14.5	MHz
	15m	21.0-21.5	MHz
	10m	*28.5-29.0	MHz

*28.5-29.0 MHz crystal installed, other crystals available as an option

Power requirements: 13.5 VDC ± 10%

Power consumption: 13.5 VDC--3A transmit, 0.4 A receive

Dimensions: 230 (W) x 80 (H) x 290 (D) mm

Weight: 5 kg.

TRANSMITTER

Emission: LSB, USB (A3J) CW (A1)

Input power: A1, A3j, 20 watts DC

Carrier suppression: Better than 50 dB below rated output

Unwanted sideband suppression: Better than 50 dB @ 1000 Hz

Spurious emission: Better than -40 dB

Distortion products: Better than -31 dB

Transmitter frequency response: 350-2700 Hz -6 dB

Frequency stability: Less than 300 Hz drift from a cold start; less than 100 Hz over a 30 minute period after warm-up.

Antenna output impedance: 50 ohms nominal

Microphone input impedance: 500 Ohms nominal

RECEIVER

Sensitivity: 0.25 uV for S/N 10 dB

Image rejection: Better than 50 dB

IF rejection: Better than 50 dB

Selectivity: -6 dB: 2.4 KHz
-60 dB: 4.0 KHz

Audio output: 3 watts @ 10% THD

Audio output impedance: 4 Ohms

SEMICONDUCTORS

Silicon Transistors:

2SA628A	(1)
2SC372Y	(13)
2SC373	(1)
2SC535A	(1)
2SC735Y	(1)
2SC784R	(1)
2SC1000GR	(1)
2SC1589	(1)
2N4427	(2)
MPSA13	(1)
MRF433	(2)

FET

2SK19GR	(8)
2SK19Y	(3)
3SK40M	(9)
JF1033B	(1)

IC

F4024PC	(1)
MC1496G	(1)
MC14011B	(1)
TA7063P	(1)
TA7205P	(1)
uPC14308	(1)

Schottky-barrier silicon diode

1SS16	(4)

Germanium diode

1N60	(8)
1S1007	(13)

Silicon diode

1S1555	(20)
10D10	(1)
U05B	(1)

Varactor diode

1S2236	(1)

Zener diode

WZ090	(1)
YZ033	(1)

ACCESSORIES

The following accessories are packaged along with your transceiver.

(1) POWER CORD
The red and black power cord is three meters long, and it comes equipped with a 6-prong connector at one end. In the middle of the cord there is a holder for the six Amp fuse for the DC line. The red wire should be connected to the positive side of the vehicle battery, and the black side is connected to the negative side.

(2) MICROPHONE
The microphone is attached to the transmitter through a four conductor screw-on connector. As shown in the diagram, pin 1 is the COMMON connection, pin 2 is the mic lead, and pin 3 is the PTT (push-to-talk) connection.

(3) COAXIAL CONNECTOR
A standard M-type ("UHF") coax connector is included for installation on coax feedline.

(4) MINIATURE PHONE PLUGS
These two miniature phone plugs are included for installation on
(1) the headphone cable, and
(2) the key lead.

(5) PLUG ADAPTER
When the key lead already has a standard 1/4" phone plug installed, this adapter will allow the lead to be used without installation of a new connector.

(6) MOBILE MOUNTING BRACKET
This bracket is to be installed in a convenient place (under the dash board, in most cases) to allow quick installation of the transceiver.

(7) EXTRA FUSE
An extra fuse for the DC lead is included in the event that the original fuse blows.
Replacement fuses should be rated for 6 Amps, slow-blow.

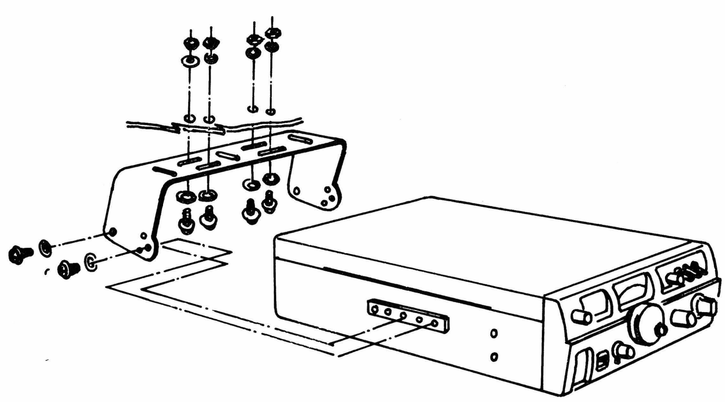
MOBILE INSTALLATION

For mobile service, the FT-7 should be installed where the controls, indicators, and microphone are easily visible and accessible for operation. The unit may be mounted in any position without loss of performance. Suitable locations are under the dash, atop transmission tunnel, etc. A universal mounting bracket is supplied with the transceiver for this purpose. Install the FT-7 as follows:

1. Use the universal mounting bracket as a template to locate the mounting holes. Use a 3/16" diameter drill for these holes and allow clearance for the transceiver, its controls, and all connecting cables. Secure the mounting bracket with the screws, washers, and nuts that are supplied, as shown in figure 1.

2. Install the transceiver on the mounting bracket using four screws, two on each side. The angle of the transceiver with respect to the bracket may be varied by changing mounting holes.

3. The microphone hanger may be affixed to any convenient place for access to the microphone.



4. The suppled power cable may be plugged directly into the vehicle's cigarette lighter receptacle for casual operation if desired. For permanent installation, the lighter plug may be removed and the leads routed directly to the battery (red positive, black negative/ground), or the nearest termination to the battery, e.g. ignition switch, fuse block, etc. If it is necessary to extend the power leads over a considerable distance, use #16AWG insulated copper wire and do not extend the leads further than necessary to avoid excessive voltage drop.

CAUTION

BEFORE CONNECTING THE POWER CABLE TO THE TRANSCEIVER, CHECK THE BATTERY VOLTAGE WITH THE ENGINE RUNNING (BATTERY CHARGING). IF THE VOLTAGE EXCEEDS 15 VOLTS DC, THE REGULATOR SHOULD BE READJUSTED SO THE HIGHEST CHARGING RATE DOES NOT EXCEED 15 VOLTS. ALSO, BE SURE TO OBSERVE PROPER POLARITY WHEN MAKING BATTERY CONNECTIONS (REVERSED POLARITY WILL NOT DAMAGE THE FT-7 DUE TO THE PROTECTIVE CIRCUITRY INCORPORATED IN THE DESIGN. HOWEVER, THE EQUIPMENT WILL NOT OPERATE UNDER THIS CONDITION).

5. Connect the power cable to the POWER receptacle on the rear panel.

6. Connect a 50 Ohm antenna feedline to the ANT receptacle on the rear panel.

7. Connect the microphone cable to the 4-pin microphone receptacle on the front panel.

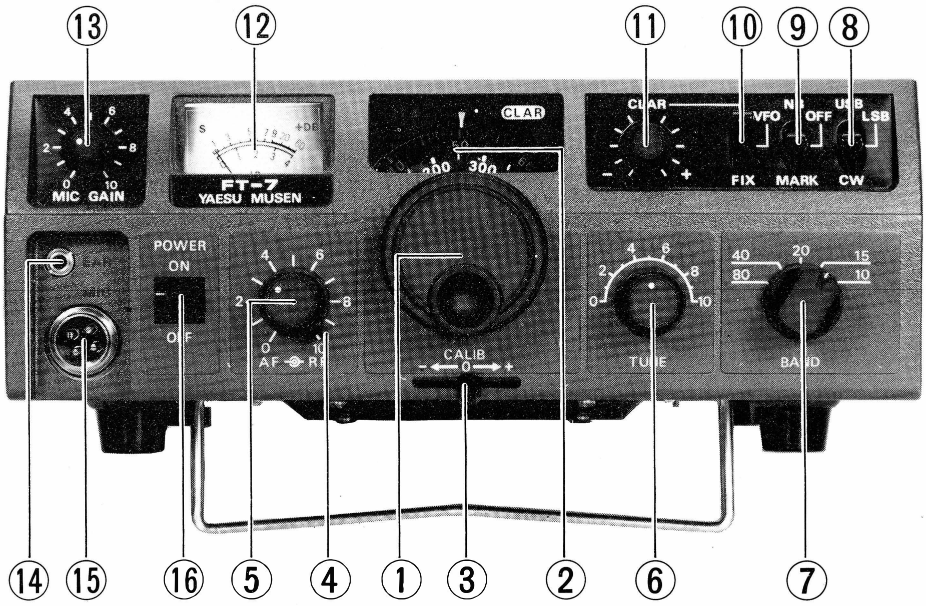
8. Connect a key, if desired, to the KEY jack on the rear panel.

9. An external 4 Ohm speaker may be connected to the SP receptacle on the rear panel if desired (this automatically disconnects the internal speaker). Use the external speaker plug provided.

BASE STATION INSTALLATION

As a base station, the FT-7 requires a source of 13.8 VDC at 3.0 amperes. The FP-7, FP-4, FP-301, and FP-301D AC power supplies will provide the necessary power.

FRONT PANEL CONTROLS



(1) TUNING KNOB
This knob controls the main VFO frequency. One revolution of the knob covers 16 KHz of bandspread.

(2) DIAL
The main tuning dial has numerical calibrations every 10 KHz, and marks every 1 KHz. The sub-dial is numerically calibrated every 100 KHz, with an additional mark every 50 KHz.

(3) CALIB
When the MARK switch is activated, the 100 KHz calibrator becomes operational, and the CALIB control allows zeroing the calibrator signal with the tuning dial calibration mark.

(4) RF GAIN
The RF GAIN control varies the gain of the receiver RF and IF amplifiers. Clockwise rotation increases the gain level.

(5) AF GAIN
The AF GAIN control varies the audio output level at the speaker and earphone jack. Clockwise rotation increases the gain level.

(6) TUNE
This control tunes all the transceiver signal circuits for the frequency being used.

(7) BAND
The BAND switch selects the frequency band desired. Coverage of 80 through 10 meters is provided.

(8) MODE
The MODE switch chooses the desired mode: USB, LSB, or CW.

(9) NB /MARK
When this switch is placed in the NB position, the noise blanker circuitry is activated.
When placed in the MARK position, the 100 KHz calibrator is activated for calibrating the main tuning dial.

(10) CLAR /VFO /FIX
This switch determines the source of frequency control. In the VFO position, frequency control is by means of the FT-7 main dial VFO. In the CLAR position, frequency control is still by means of the main VFO, but the clarifier control will allow receiver offset tuning of ±2KHz. In the FIX position, crystal control of the transceive frequency is possible.

When the CLAR or FIX positions are used, a small light will so indicate in the window above the main tuning dial.

(11) CLARIFIER
This control allows ±2KHz receiver offset tuning without affecting the transmitter frequency, when the switch (10) is placed in the uppermost position.

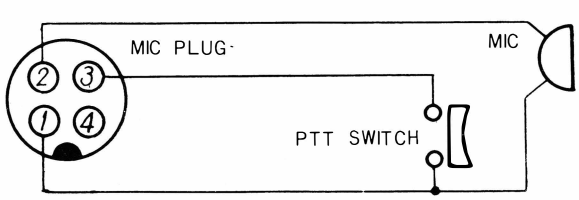
(12) METER
The front panel meter functions as an S meter while on receive. In the transmit condition, the meter reads collector current for the final amplifier transistors on a scale of 0-4 Amps.

(13) MIC GAIN
This control varies the gain of the microphone amplifier stage. Clockwise rotation increases the microphone amplifier gain.

(14) EAR
This jack accommodates a 4-8 Ohm headphone through a miniature phone plug. When the plug is inserted into this jack the external speaker jack and the internal speaker are disconnected.

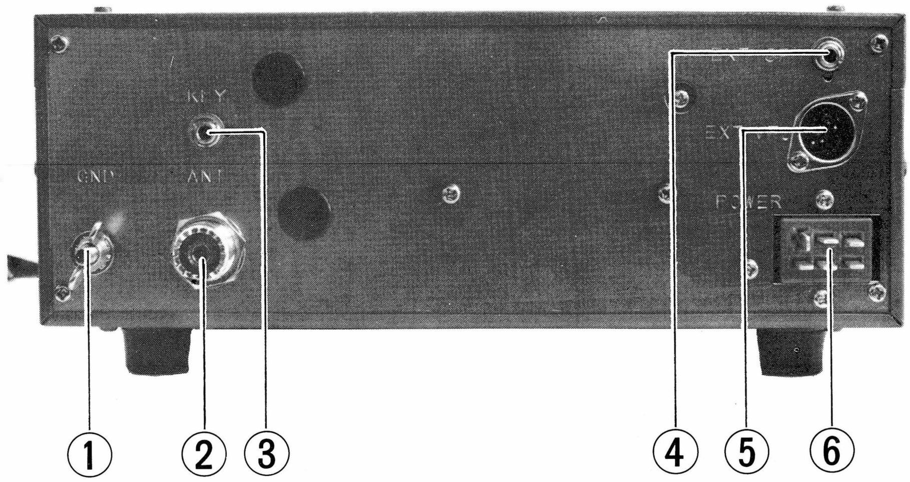
(15) MIC
A four-pin socket accommodates the microphone plug for microphone and PTT input.

(16) POWER
This is the main power ON/OFF switch.



Microphone plug connection

REAR APRON CONNECTIONS



(1) GND
Ground connection to car body or earth ground.

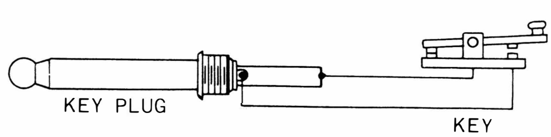
(2) ANT
This is a standard M ("UHF") female coaxial cnnector for the antenna feedline.

(3) KEY
For CW operation, the key plug (miniature phone type) is inserted into this jack.

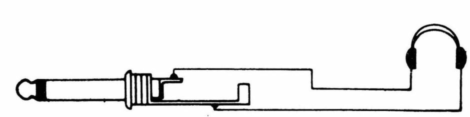
(4) EXT SP
An external 4 Ohm speaker may be connected to this jack.

(5) EXT VFO
This socket provides connections for an external VFO.

(6) POWER
The main power cord is connected at this point.



Key plug connection



Headphone and external speaker connections

INSTALLATION

ANTENNA CONSIDERATIONS

For full transmitter output power, the antenna system must present a resistive impedance of very close to 50 Ohms. The protective circuitry for the final transistors will automatically reduce the collector current and, hence, the power output, if a high SWR condition exists. If the SWR cannot be kept below 1.5:1 with respect to 50 Ohms an antenna coupler such as the Yaesu FC-301 should be used to secure a 50-Ohm load impedance for the FT-7.

When the SWR is 1.0:1, 100% output power is produced. With a 1.5:1 SWR, 80% output power is produced. At 2.0:1 the power is reduced to 50%, and at 3.0:1 it is 20% of the full rated output.

The YAESU RS- series of mobile antennas is designed for use with the FT-7. The RSM-2 and the RSE-2 element form the foundation for the system, and the RSL-3.5-28 whip resonators are utilized to provide HF band coverage. For two meter band coverage, the RSL-whip may be removed and the RSE-2 used as a two-meter antenna.

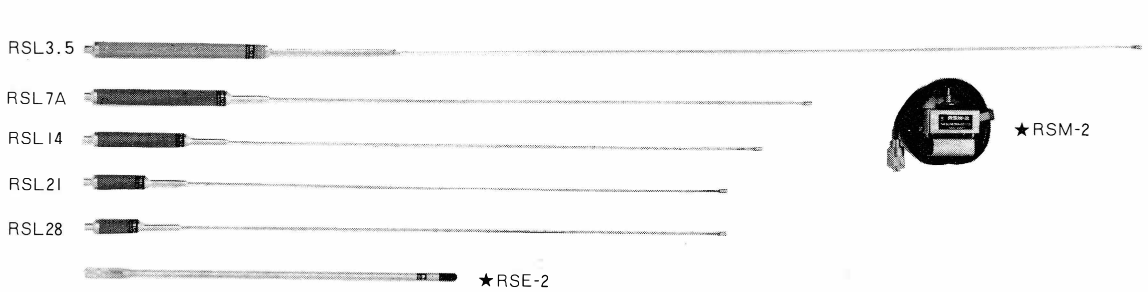
IMPORTANT NOTE

BEFORE ATTEMPTING OPERATION OF YOUR FT-7, PLEASE READ THE FOLLOWING SECTIONS DEALING WITH POWER CONNECTIONS AND TUNE-UP CAREFULLY. WHILE THE FT-7 IS EXTREMELY STRAIGHTFORWARD AS TO ITS OPERATION, THE OPERATOR MAY BE UNFAMILIAR WITH THE FUNCTIONS OF SOME OF THE CONTROLS, AND THE FOLLOWING SECTIONS SHOULD MAKE THEM CLEAR.

POWER SOURCES

The FT-7 is designed to operate from a 13.5 VDC power source capable of supplying 6 Amps continuous current. For mobile use, connect the power cord red lead to the positive battery terminal, and the black lead to the negative (ground) side.

For operation from 117 VAC, use the FP-7 or FP-4 power supply. If it is desired to use the FL-110 100-watt amplifier, the FP-301D or FP-301 power supply may be used to supply power for both the FT-7 and the FL-110.



ADVANCE PREPARATION

Before power is applied, the operator should read this manual carefully, and should inspect the transceiver to become familiar with the locations of all the switches and controls.

(1) When initial tune-up is attempted, it is very desirable that a dummy load of 50 Ohm impedance be used, so as to prevent any confusion created by reduced power output because of high SWR. When an antenna is connected to the rear panel receptacle, it should be pre-tuned in advance with a different transmitter, so as not to damage the FT-7 output transistors with extremely high SWR.

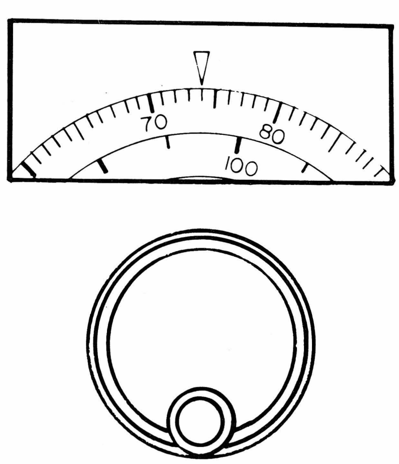
(2) A standard low impedance (500-600 Ohm) microphone should be connected to the microphone receptacle on the front panel.

(3) For CW operation, a key should be connected to the jack on the rear panel.

MAIN TUNING DIAL FREQUENCY READOUT

(1) Coarse frequency determination is made by referring to the lower of the two analog dials. The lower one has numerical calibrations every 100 kHz and a calibration mark every 50 kHz. The upper dial has numerical calibrations every 10 kHz, with resolution marks to 1 kHz.

(2) Frequency readout on all bands is determined by adding the frequency on the main tuning dial to the frequency of the lower band edge. For 40m, 20m, 15m, and 10m band segments A and C, the band edge begins at 000 (for example 7000 kHz on 40 m). On 80m and 10m band segments B and D, the lower band edge begins with 500 (for example, 28500 kHz on 10m B). Thus, a reading of 074 on the main tuning dial will represent 3574 kHz 7074 kHz, 21074 kHz, 28074 kHz, 28574 kHz, 29074 kHz, or 29574 kHz, depending on the position of the band switch.



OPERATING INSTRUCTIONS

With the POWER switch in the OFF position, connect the power cord to the 6-pin POWER receptacle on the rear panel of the FT-7.

(1) For SSB operation, LSB is used on the 3.5 and 7 MHz bands, while USB is standard on 14, 21, and 28 MHz. Preset the controls as follows:

MODE: Desired mode
NB/MARK: OFF
VFO/FIX/CLAR: VFO
DIAL: Desired frequency
TUNE: 12 o'clock position
BAND: Desired Band
AF GAIN: Fully counter-clockwise
RF GAIN: Fully clockwise

(2) Flip the FT-7 POWER switch to ON. If using AC power, flip the FP-7 or FP-4 power switch to ON. The FT-7 dial light should be illuminated with the power on.

(3) Adjust the AF GAIN control for a comfortable listening level.

(4) Vary the TUNE control for maximum receiver background noise.

(5) Rotate the DIAL as needed to tune in the desired frequency.

(6) If a large excursion is made with the DIAL, the TUNE control may require readjustment. Also, the AF GAIN control will require adjustment to maintain a comfortable listening level.

(7) The VFO/FIX/CLAR switch may be placed in the CLAR position to vary the receive frequency ± 2 kHz without changing the transmit frequency.

(8) The NB/MARK control may be placed in the NB position to minimize interference due to noise.

TUNE-UP

(1) The initial tune-up procedure for CW and SSB is the same for both modes. Preset the controls as follows:

MODE: CW
DIAL: Desired frequency
TUNE: Peaked as per preceding section
BAND: Desired band

With the MODE switch in the CW position and no plug inserted in the KEY jack, the transmitter may be placed in the "key down" position for tuning by simply closing the microphone PTT button.

(2) Turn the POWER switch to ON. If on AC power, turn FP-4 /FP-7 power switch to ON.

(3) Press the microphone PTT switch to activate the transmitter.

(4) Rotate the TUNE control for maximum meter reading.

(5) Release the microphone PTT button to return to the receive condition.

SSB OPERATION

(1) Following the initial tune-up described above, place the MODE switch in the USB or LSB position as appropriate for the band in use.

(2) Press the microphone PTT button and speak into the microphone in a normal voice. Advance the MIC GAIN control until the meter indicates 1/2 to 2/3 the level observed while tuning in the CW position.

(3) Release the microphone PTT switch. You are now tuned up for SSB operation.

(4) The MIC GAIN control should never be advanced more than necessary to achieve the 1/2 to 2/3 scale deflection, excessive mic gain may cause distortion of the output signal.

CW OPERATION

1) Plug a key into the KEY jack on the rear panel. CAUTION: when using an electronic keyer, the operator should be sure that the keyer output transistor or relay is rated for the current and voltage present at the key jack. The key line is +8V at 300 uA key down current.

2) Set the MODE switch to CW

3) Automatic CW semi-break-in is utilized in the FT-7. When the key is closed, the transmitter is automatically activated, and when the key is opened, the transceiver returns to the receive condition after a slight delay. The length of the time delay can be varied to suit the operator by adjustment of VR702.

4) In the key down condition, the IC meter should indicate "3", while it should read "0" while in the transmit condition but "key up".

5) To ensure accurate keying, a sidetone monitor is built in. When the transmitter is keyed, this sidetone will be heard on the speaker. The sidetone volume level may be adjusted by varying VR701.

6) When the keying speed is very slow, the keying relay in the transceiver may return to receive in the middle of a letter or word. If this is the case, it may be to the advantage of the operator to use the PTT switch to activate the transmitter.

DIAL CALIBRATION

1) Set the NB/MARK switch to MARK and VFO/FIX switch to VFO position.

2) Set the main tuning dial to the 100 kHz position nearest the desired operating frequency.

3) Adjust the lever underneath the main tuning knob for zero beat against the marker signal.

FIX (CRYSTAL CONTROLLED) OPERATION

Fixed channel operation is possible by using crystals installed in the FIX UNIT. The VFO/FIX switch must be placed in the FIX position. There is only one crystal controlled channel available per band with the FT-7.

MODE / BAND	USB	LSB	CW
80m	8998.5	9001.5	8999.3
40m	12498.5	12501.5	12500.7
20m	19498.5	19501.5	19500.7
15m	26498.5	26501.5	26500.7
10mA	33498.5	33501.5	33500.7
10mB	33998.5	34001.5	34000.7
10mC	34498.5	34501.5	34500.7
10mD	34998.5	35001.5	35000.7

Figure 1 (kHz)

Type	HC-25/U
Load Capacitance	30pF
Series Resistance	25 Ohms or less
Static Capacitance	7pF or less
Drive Level	5mW

Figure 2

Crystals used in the FT-7 must meet the specifications shown in Fig. 2, and they are available through your Yaesu dealer. Crystal frequencies must fall between 5500-5000 kHz. Frequency calculation is made from the formula $F_x = F_1 - F_0$, where F_x is the crystal frequency, F_0 is the desired operating frequency, and F_1 is a constant derived from Fig. 1.

For example, let us say that it is desired to operate on 7199 kHz LSB. Referring to Fig. 1, we see that for 40-meter LSB, F_1 is 12501.5. Subtract F_0 (7199 kHz) from F_1 (12501.5) to equal 5302.5 kHz (F_x) For example, let us say it is desired to operate on 21420 kHz USB. From Fig. 1, F_1 is 26498.5; subtract 21420 from 26498.5 to equal F_x of 5078.5 kHz.

Inspection of the values of F_1 in Fig. 1 will reveal that the 7199 kHz crystal for LSB will work on 14199 kHz, 21199 kHz, etc. Of course, LSB is not normally used on these bands. If the operator switches to USB, the operating frequency (in this case 7199, 14199, etc.) will be moved 3 kHz down to 7196, 14196, etc. If the move is made from LSB to CW, the frequency moves down 800 Hz (to 7198.2, 14198.2, etc.) except on 80 meters, where the shift is 1.2 kHz down.

CIRCUIT DESCRIPTION

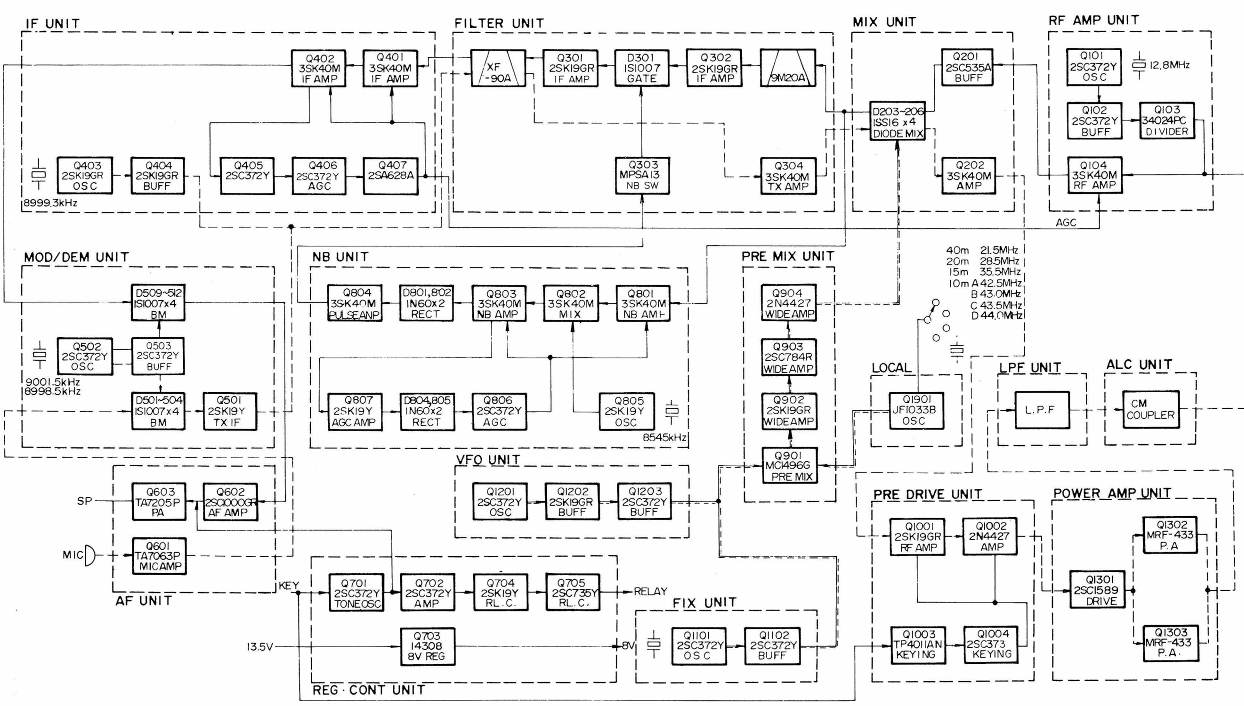
The FT-7 transceiver utilizes plug-in modules for the most efficient use of space and to simplify the trouble-shooting and repair process. The transceiver is all solid-state, and the receiver and transmitter operate in a single-conversion configuration utilizing a premix heterodyne technique which greatly reduces signal distortion in both the transmit and receive modes.

RECEIVER

The incoming signal from the antenna is fed through the antenna relay RL2102, (normally open) band switch S1901, and the tuning circuit consisting of T1921-T1925 and VC1901 to pin 9 of the RF/MARK unit PB-1633. The signal is then fed to gate 1 of the RF amplifier Q104 (3SK40M), a dual-gate MOS FET. The AGC (Automatic Gain Control) voltage is applied to gate 2 of Q104 to control the gain of this stage, to avoid overloading in the following stages.

The amplified signal is fed through the passband tuning circuit to the mixer unit PB-1631. The buffer amplifier Q201 (2SC535A) is used to accomplish impedance matching between the RF amplifier and the diode mixer consisting of D203-D206 (all 1SS16), where the incoming signal is mixed with the signal from the premix circuit. Schottky barrier diodes are used for the mixer to secure high dynamic range with low noise.

The mixer produces a 9 MHz IF signal at the output of T201. The IF signal is fed through a low-pass filter consisting of L201, C202, C201, and a diode switch D201 (1S1555), to the FILTER unit PB-1626.



FT-7
BLOCK DIAGRAM

The IF signal is passed through a monolithic filter X301 and is amplified by IF amplifiers Q301 and Q302 (both 2SK19GR). A noise blanker diode D301 (1S1007) is controlled by Q303 (MPSA13) to cut impulse noise.

The output from Q302 passes through an 8-pole crystal filter and a diode switch D303 (1N60), and is fed to the IF unit PB-1625. The signal is further amplified by Q401 and Q402 (both 3SK40M). The amplified signal is fed to the ring demodulator consisting of D509-D512 (all 1S1007). The carrier signal is also fed to the ring demodulator from the buffer amplifier Q503.

Audio output from the ring demodulator is fed to the AF unit PB1648 and is amplified by Q602 (2SC1000GR) and Q613 (TA7205P), to deliver 3 watts of audio signal to the speaker.

A part of the IF signal is fed to pin 2 of NB unit PB-1627. When the NB/MARK switch is placed in the NB position, the signal is amplified by Q801 (3SK40M) and fed to the gate of noise blanker mixer Q802 (3SK40M), where the 8545 kHz signal generated by Q805 (2SK19Y) is mixed with the incoming IF signal to produce a 455 kHz signal is then amplified by Q803 (3SK40M).

When a carrier or noise-free modulated signal is received, the 455 kHz signal with its corresponding strength is rectified by D 801 and D802 (both 1N60) to charge C813. There is no discharge loop for C813; therefore, a signal which exceeds the charged voltage established by the reference voltage on C813 will not pass through D801 and D802. Accordingly, there will be no voltage drop across R819, and Q804 (3SK40M) will conduct as the gate voltage approaches zero, causing the drain voltage to drop.

The drain of Q804 is connected directly to the base of noise gate controller Q303 (MPSA13) in the FILTER unit. The voltage drop of the drain will turn off Q303, causing a forward bias to D301. As D301 conducts, the signal will pass through the circuit.

When impulse-type noise which exceeds the charged reference level voltage on C813 is received, D801 and D802 will permit negative-going pulses to turn off Q804. Thus, Q303 will conduct. As a result, D301 will be biased to block the signal passage.

The signal amplified by Q807 (2SK19GR) is rectified by D804 and D805 (both 1N60). The rectified DC voltage is amplified by DC amplifier Q806 (2SC372Y) and fed to the gate of Q801 and Q803 to control the gain of these stages.

The crystal-controlled marker generator Q101 (2SC372Y), located on the RF/MARK unit, generates a basic 12.8 MHz signal. The 12.8 MHz signal is fed through a buffer amplifier Q102 (2SC372Y) to a frequency divider Q103 (34024PC) to produce the 100 kHz marker signal. The 100 kHz marker signal is fed through pin 4 and pin 9 to the receiver front end.

TRANSMITTER

Speech input from the microphone jack J2108 is fed through the MIC GAIN control VR2103 to pin 2 of the AF unit PB-1648. The speech signal is amplified by Q601 (TA7063P), then fed to the ring modulator D501-D504 (all 1S1007) in MOD/DEM unit PB-1624. The resulting 9 MHz DSB signal is amplified by Q501 (2SK19Y) and fed through a diode switch D505 (1S1555) to the FILTER unit.

The signal is amplified by a buffer, Q302 (2SK19GR), and fed to the crystal filter X302 where the unwanted sideband is rejected. The 9 MHz SSB signal generated by the filter is fed through diode switch D302 (1N60) to Q304 (3SK40M), and its output signal is fed to pin 4 of MIX unit PB-1631. The 9 MHz SSB signal is heterodyned to the desired RF frequency by injection of the local signal which is supplied from the PRE MIX unit PB1630A.

The RF output from the diode mixer is amplified by Q202 (3SK40M) and fed through diode switch D208 (1S1555) and bandpass transformers T1906-T1911 to PRE DRIVE unit PB-1632. Transformers T1906-T1911 are used on both transmit and receive to provide unsurpassed selectivity. The RF signal is amplified by Q1001 (2SK19GR) and Q1002(2N4427) and fed to the 10W AMP unit PB-1443. The output from the PRE DRIVE unit is amplified by the driver Q1301 (2SC1589) to drive the push-pull power amplifier consisting of Q1302 and Q1303 (both MRF 433), which produces a nominal power output of 10 watts.

A nonresonant, broadband power amplifier such as the one used in the FT-7, utilizing ferrites and the most advanced circuitry, eliminates the nuisance of having to tune up when changing bands.

The negative feedback circuitry, which consists of R1310, R1311, C1113, and C1114, stabilizes the final amplifier and delivers a clean signal to the output circuitry. Zener diode D1301 (YZ033) sets the bias for Q1301-Q1303 at exactly 3V.

Silicon diodes D1302 and D1303 (10D10) are mounted on Q1302 and Q1303, respectively, to compensate bias, as well as to protect them from thermal runaway.

The band switch S2102 selects the proper low-pass filter network for the band in use. The signal passes through T1501 in the ALC unit PB-1637 and the antenna relay RL 2102 to the antenna terminal J2101. T1501 detects the forward and reflected waves; the forward wave is rectified by D1502 (1S1007), and the reflected wave by D1504 (1S1007), to generate ALC voltage. The ALC threshold level of the forward wave is set by VR1501.

When there is an excessive amount of reflected power due to high SWR, the reflected wave is rectified by D1503 (1S1007) producing minus voltage to the ALC line. The ALC voltage reduces the gain of Q304 to prevent overloading or distortion.

For CW transmission, the crystal oscillator Q403 (2SK19GR) in the IF unit oscillates at 8999.3 kHz (the carrier frequency). This CW carrier is amplified by Q404 (2SK19GR) and fed through pin 5 to Q302 in the FILTER unit.

In the CW mode, the emitter voltage of Q1001 and Q1002 is controlled by the keying switch transistor Q1004 (2SC373). A flip-flop circuit utilizing Q1003 (MC14011B) is employed to secure a perfectly-shaped waveform for CW transmission free of clicks at any keying speed.

The tone oscillator Q701 (2SC373) operates when the MODE switch is in the CW position. It consists of a phase-shift oscillator operating at approximately 800 Hz. The tone output is activated by the keying circuit and is coupled to Q702 (2SC372Y) for semi-break-in CW operation. The relay delay hold time is adjusted by VR702. The output is also fed to Q603 (TA7205P) through level set potentiometer VR701 for CW sidetone monitoring.

COMMON CIRCUITS

The carrier oscillator Q502 (2SC3724) is followed by a buffer amplifier Q503 (2SC372Y). It oscillates at either 8998.5 kHz (40-10 meters LSB, 80 meters USB) with X901 or 9001.5 kHz (40-10 meters USB, 80 meters LSB) with X902 depending on the mode of operation. The crystal selection is made by diode switches D507 and D508 (1S1555). The carrier is then fed through a relay RL501 to the ring modulator and demodulator.

The LSB crystal is used for CW reception on all bands. For CW transmission, the oscillator in the IF unit oscillates with X401.

A modified Colpitts type oscillator is used to generate a 5.0-5.5 MHz signal to produce a stable 500 kHz tuning range. The frequency is varied by VC1201, which is geared to a precision-built dial tuning mechanism.

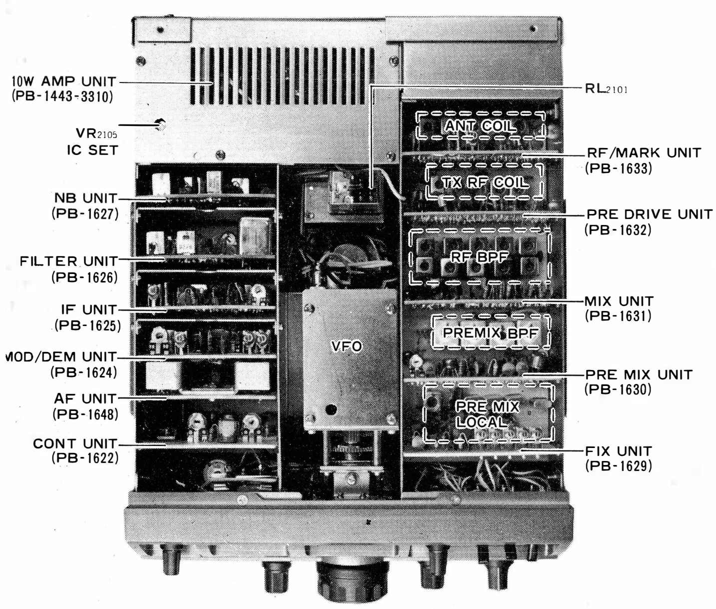
The varactor diode D1201 (1S2236) is in series with C1207, and the combination is in parallel with VC1201. By closing the clarifier switch, the clarifier control shifts the receiver ± 3 kHz.

The VFO output signal is fed through the amplifier/buffer stage Q1202 (2SK19GR) and Q1203 (2SC372Y), the low-pass filter, and the diode switch D1202 (1S1555) to the PRE MIX unit PB1630.

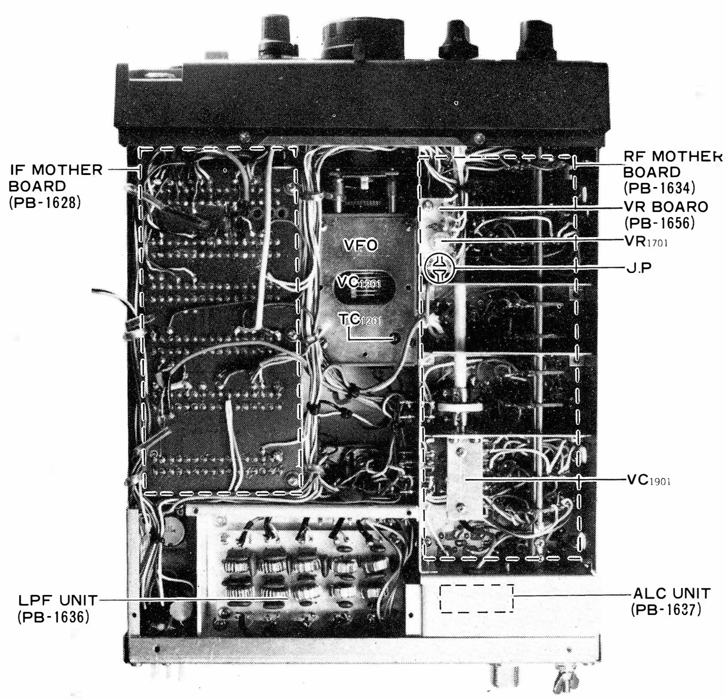
In addition to normal VFO operation, a crystal-controlled channel may be used. Crystal oscillator Q1101 (2SC372Y) is followed by buffer amplifier Q1102 (2SC372Y), and its output is fed through the low-pass filter abd diode switch D1901 (1S1555) to the PRE MIX unit. Trimmer capacitors TC1101-TC1105 are used for fine adjustment of each crystal frequency.

Crystal oscillator Q1901 (JF-1033) produces a heterodyne signal selected by the band switch. The signal is fed to the double balanced mixer Q901 (MC-1496G) in the PRE MIX unit PB-1630, where the signal is mixed with a signal from the VFO. The output from the mixer is fed through bandpass transformers T1902-T1905 to the broadband amplifier Q902 (2SK19GR), Q903 (2SC784R), and Q904 (2N4427). The premix output signal is then applied to the diode mixer in the MIX unit.

40m	X1902	21.5MHz	HC-18/U
20m	X1902	28.5MHz	HC-18/U
15m	X1903	35.5MHz	HC-18/U
10mA	※	42.5MHz	HC-25/U
10mB	X1904	43.0MHz	HC-25/U
10mC	※	43.5MHz	HC-25/U
10mD	※	44.0MHz	HC-25/U



TOP VIEW



BOTTOM VIEW

MAINTENANCE AND ALIGNMENT

General

This transceiver has been carefully aligned and tested at the factory prior to shipment. The reliability of the solid state devices used in the FT-7 should provide years of trouble-free service if the equipment is not abused and the proper routine maintenance is carried out.

Do not attempt to align the transmitter without having a proper dummy load or antenna connected to the transceiver. We highly recommend off-the-air testing using a dummy load as a courtesy to other operators.

The following alignment procedure requires certain test equipment such as an RF signal generator, an audio oscillator, a sweep generator, an oscilloscope, and a VTVM. Without proper test equipment, do not attempt to adjust cores or potentiometers.

Control Unit (PB-1622)

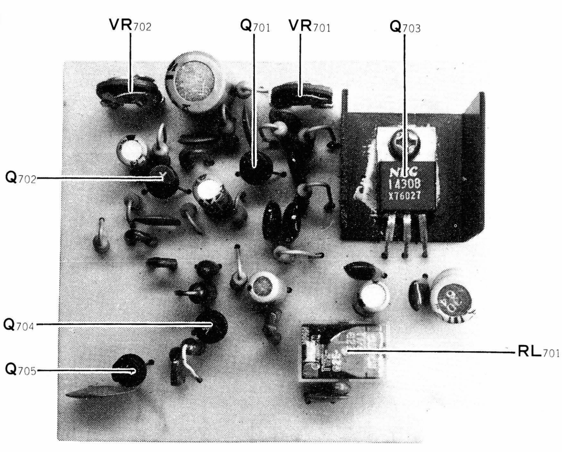
(1) CW relay delay adjustment (VR702):

(a) Connect a dummy load or matched antenna to the ANT connector. Connect a key to the KEY jack, and place the MODE switch in the CW position.

(b) When the key is closed and then opened again, it will be observed that there is a delay between the instant the transceiver returns to "receive." The length of the delay may be varied by adjustment of VR702, in order to provide the proper delay for the keying speed used and/or the preferences of the individual operator.

(2) Sidetone level adjustment (VR701)

(a) The level of the CW sidetone may be adjusted by varying VR701 while the key is closed.



CONT UNIT(PB-1622)

MOD/DEM UNIT (PB-1624)

(1) SSB carrier point (TC502, TC503):

(a) Settings: BAND.....................20
DIAL.................... 14.25 MHz
MODE...................CW
Peak the TUNE control to secure maximum output.

(b) Place the MODE switch in the USB position. Connect the output of an audio oscillator to the microphone input. Set the frequency to 1 kHz and transmit on USB. Adjust the MIC GAIN control for 8 watts RF output to the dummy load.

(c) Shift the audio frequency to 300 Hz without changing audio output level or MIC GAIN control.

(d) Switch between USB and LSB while adjusting TC502 for USB and TC503 for LSB to obtain 2 watts output on each sideband. (Note: For the 80 meter band, TC502 will adjust LSB and TC503 will adjust USB, but the alignment here is taking place on 20 meters.

(e) Return to the receive mode. Switch the MODE selector back and forth between USB and LSB. The tone quality of the background noise on the two sideband modes should sound alike.

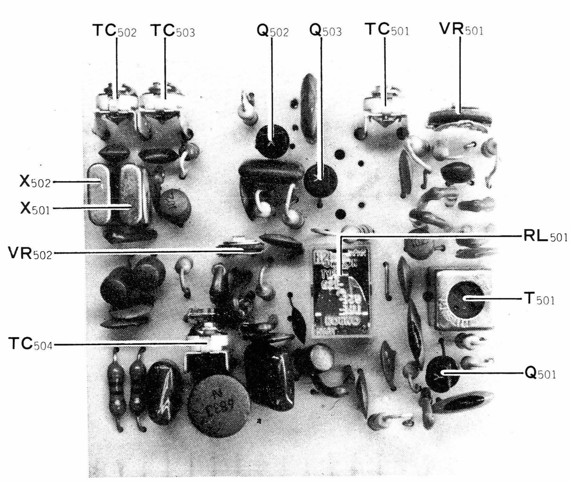
(2) CARRIER BALANCE

(a) Settings: BAND...................20
DIAL. ....14.25 MHz
MODE...................USB

No input to the mike jack.

(b) Connect a dummy load to the antenna receptacle and the RF probe of a VTVM to the antenna receptacle, J2101. Adjust TC501 and VR501 alternately to minimize the VTVM reading.

(c) If no VTVM is available, use a monitor receiver and adjust TC501 and VR501 for the minimum S meter reading.



MOD/DEM UNIT(PB-1624)

IF UNIT (PB-1625)

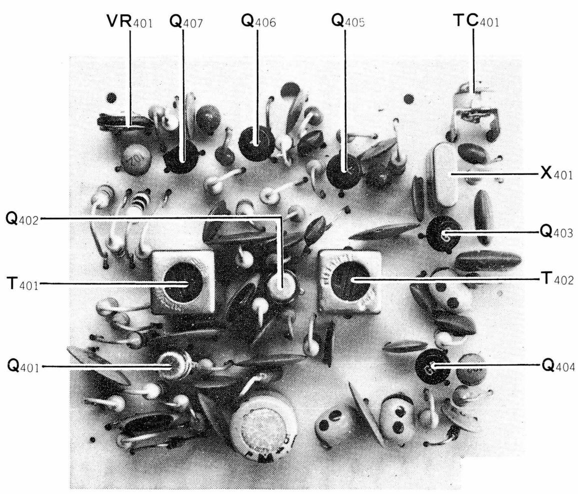
(1) CW carrier level adjustment (TC401):

(a) Connect the RF probe of a VTVM to pin 2 of PB-1625. With the MODE switch in the CW position and the key closed, adjust TC401 for a reading of 75 mV ± 10 mV.

(2) S-meter calibration (VR401):

(a) Place the band switch to 40 meters and the MODE switch to USB. Connect a signal generator to the antenna receptacle, and set the generator frequency to the receiver frequency.

(b) Adjust the signal generator output to 87 dB. Adjust VR401 for full scale S-meter deflection.



IF UNIT (PB-1625)

LOCAL UNIT

(1) Local oscillator level adjustment (T1901, TC1901-TC1904)

(a) Connect the RF probe of a VTVM to TP 1901. Place a crystal for the 10mD band (44 MHz) in the socket for the 10 meter band. Adjust the core of T1901 for a reading of 50 mV on the VTVM.

(b) Place the crystal for the 10mB band (43 MHz) in the 10 meter band crystal socket. Adjust TC1904 for a reading of 50 mV on the VTVM.

(c) Switch to the 15 meter band. Adjust TC1903 for a reading of 50 mV on the VTVM.

(d) Switch to the 20 meter band. Adjust TC1902 for a reading of 50 mV on the VTVM.

(e) Switch to the 40 meter band. Adjust TC1901 for a reading of 50 mV on the VTVM.

(2) Premix bandpass filter adjustment (T1902-T1905):

The adjustment of the bandpass filters is critical with respect to spurious response. A sweep generator and a scope are required for proper alignment.

(a) Locate PB-1656, which can be found on the bottom side of the RF mother board (see photo on page). Locate JP on PB-1656. For this alignment, remove the solder on the shorting device, breaking the connection.

(b) Connect the output of a sweep generator to TP1901 and the RF probe of a scope to TP1902. Monitor the wave patterns on the scope by offsetting the balancing potentiometer VR901 on the PREMIX unit.

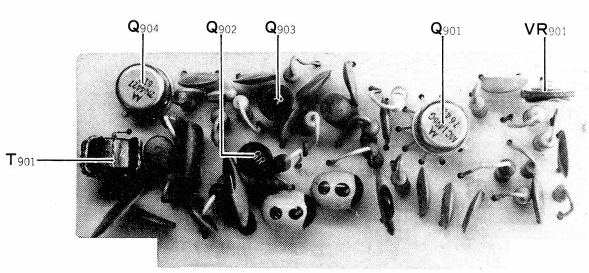
(c) Set the VFO/FIX switch to FIX to disconnect the VFO from the circuit. Apply 30 dB sweep output to TP1901.

(d) Adjust the bandpass filter transformer cores as follows, so that the passband characteristics become as flat as possible within the passband range specified, and maximum attenuation out of range.

BAND	PASSBAND	CORE ADJUSTMENT
40	16.0-16.5 MHz	T1902
20	23.0-23.5 MHz	T1903
15	30.0-30.5 MHz	T1904
10	37.0-37.5 MHz	T1905

PREMIX UNIT (PB-1630)

(1) Premix balance (VR901): Connect the RF probe of a VTVM to TP1902. Place the VFO/FIX switch in the FIX position. Adjust VR901 for a minimum reading on the VTVM.



PRE MIX UNIT(PB-1630)

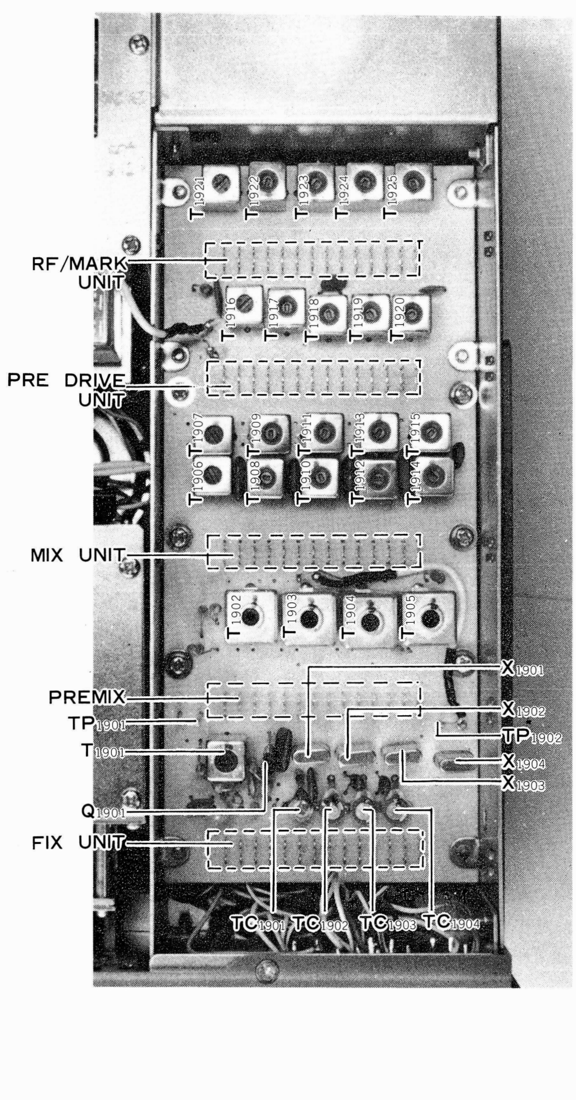
Transmit/receive frequency bandpass filter adjustment (T1906-T1915):

(a) Connect the output of the sweep generator to the antenna receptacle, and the scope input to the emitter of Q201 on the MIX unit. Remove the IF unit, and cut off the AGC voltage. Conncet a jumper between pin 10 and pin 11 of the RF unit, and connect a 100 Ohm resistor between pin 8 and pin 9 of the RF unit to reduce the input Q of the circuit.

(b) Adjust the transformer cores as follows, to secure the most flat response possible over the passband indicated:

80m Band	3.5MHz~ 4.0MHz	(T_{1906}, T_{1907})
40m Band	7.0MHz~ 7.5MHz	(T_{1908}, T_{1909})
20m Band	14.0MHz~14.5MHz	(T_{1910}, T_{1911})
15m Band	21.0MHz~21.5MHz	(T_{1912}, T_{1913})
10m Band	28.0MHz~30.0MHz	(T_{1914}, T_{1915})

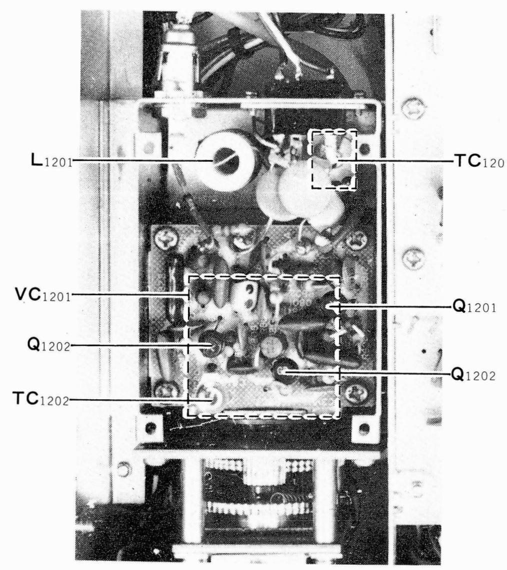
(c) After making the necessary adjustments, return the circuitry to its original condition: remove the 100 Ohm resistor and jumper from the RF unit, restore the AGC voltage, and replace the IF unit.



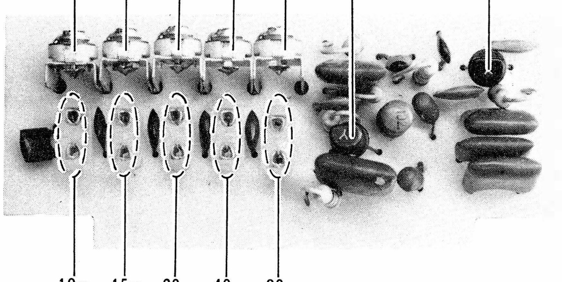
(3) VFO unit (PB-1440A-3310)
Skilled technique is required as well as advanced knowledge to align the VFO unit. It is, therefore, recommended that all VFO work be referred to qualified personnel should a case develop where a repair is needed on the VFO unit.

TC1201: Band setting trimmer capacitor.

TC1202: A split-type trimmer capacitor for temperature compensation.



(4) It is possible to use one crystal controlled channel per band with the FT-7. The crystal should be inserted in the socket appropriate for the band to be used, and TC1101, 1102, 1103, 1104, and 1105 provide fine frequency tuning for the 80, 40, 20, 15, and 10 meter bands, respectively.



FIX UNIT(PB-1629)

(5) Clarifier zero setting (VR1701):

(a) Tune the transceiver to the marker or a signal generator on any band.

(b) Set the CLAR control to the 12 o'clock position. Turn on the CLAR switch, and tune the main dial for a zero beat to the marker or signal generator.

(c) Now turn the CLAR switch to VFO, and if the tone of the marker or signal generator is changed (away from zero beat) secure zero beat by adjusting VR1701.

(d) Replace the solder bridge on shorting device JP on PB-1656.

(6) RF tracking (T1916-T1925)

(a) Connect a dummy load or matched antenna to the antenna receptacle on the rear panel. Set the transceiver controls as follows:

MODE.............CW
DIAL..............250
TUNE...Center scale ("5")

(b) Set the band switch to 80. While transmitting, adjust T1916 for maximum power output into the dummy load.

(c) Repeat this procedure on each band, adjusting the transformers appropriate for the bands selected:

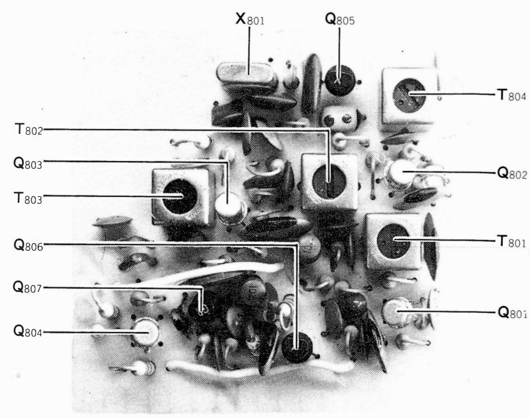
BAND	CORE ADJUSTMENT
40	T1917
20	T1918
15	T1919
10	T1920

(d) Remove the dummy load from the antenna receptacle and connect a signal generator to the antenna receptacle. While receiving, zero the signal generator output to the frequency to be adjusted (3750, 7250, etc.) and adjust the transformer cores below for maximum deflection of the S-meter:

BAND	CORE ADJUSTMENT
80	T1921
40	T1922
20	T1923
15	T1924
10	T1925

(e) Other coils:

UNIT	COIL	PROCEDURE
FILTER	T-301- T-304	Peak to 9MHz on receive
	T305	Peak to 9MHz on transmit
IF	T401, T402	Peak to 9MHz on receive
MOD/ DEM	T501	Peak to 9MHz on transmit
NB	T801	Peak to 9MHz on receive, NB ON
	T802, T803	Peak to 455 kHz on receive, NB ON
	T804	Peak to 8545 kHz on receive, NB ON



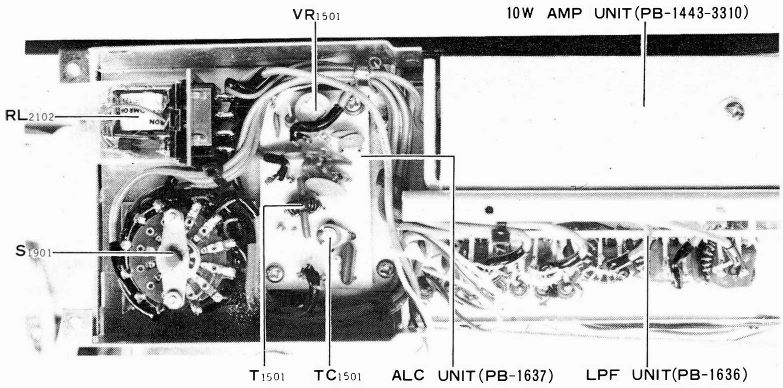
NB UNIT(PB-1627)

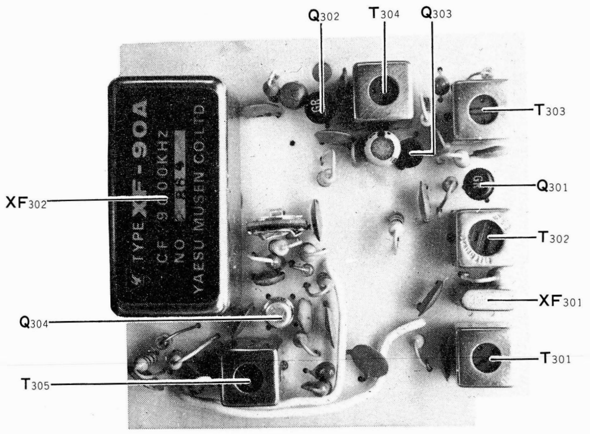
ALC UNIT (PB-1637)

(a) Connect a dummy load to the antenna receptacle. Set VR1501 to the fully clockwise position. Peak the transmitter for maximum power output on 10 meters, CW mode. Adjust TC1501 for maximum power output to the dummy load.

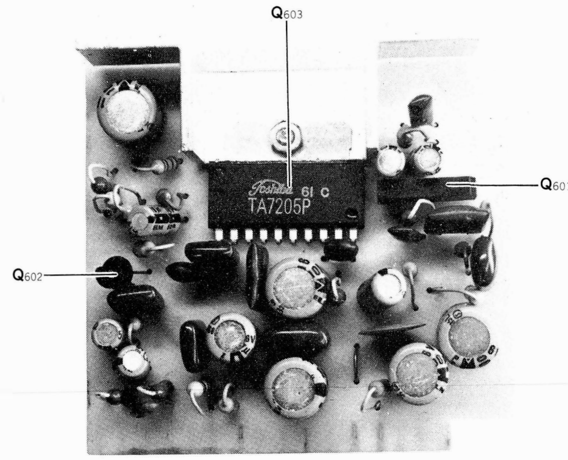
(b) Peak the transmitter for maximum output on 80 meters, CW mode. Slowly rotate VR1501 until the output power just starts to fall.

(c) Care must be exercised when adjusting VR1501 using other than a 50 Ohm resistive dummy load; a high SWR condition on the transmission line will cause an improper setting of VR1501.

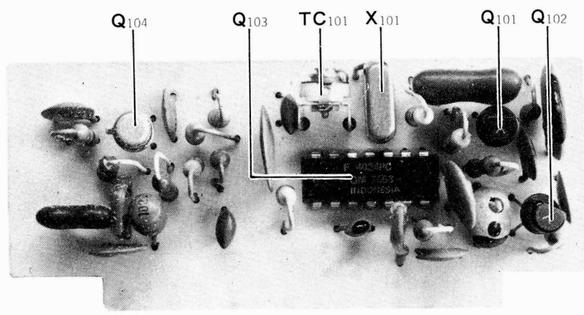




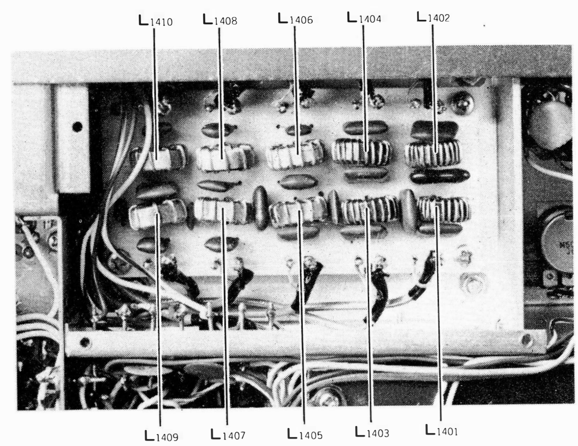
FILTER UNIT(PB-1626)



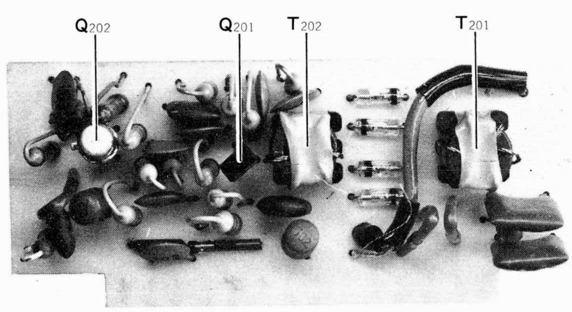
AF UNIT(PB-1648)



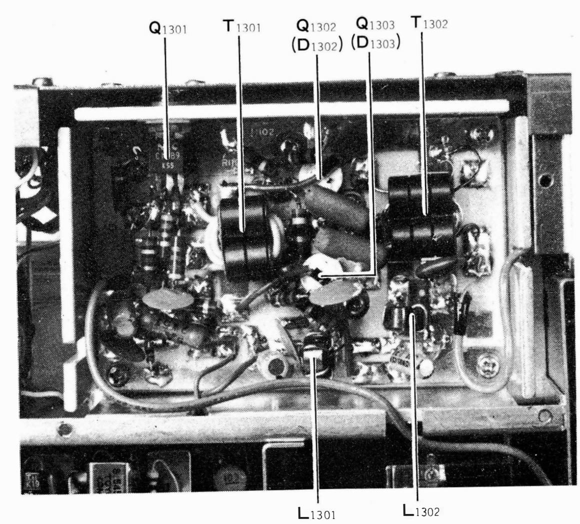
RF/MARK UNIT(PB-1633)



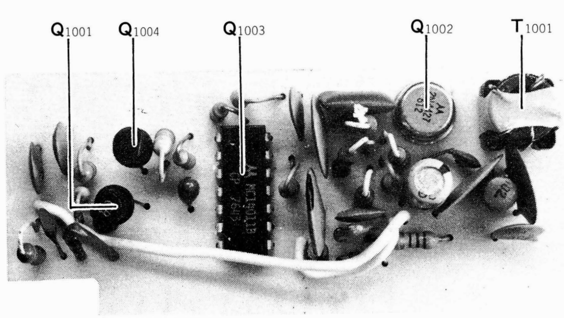
LPF UNIT(PB-1636)



MIX UNIT(PB-1631)



IOW AMP UNIT(PB-1443-3310)



PRE DRIVE UNIT(PB-1632)

PARTS LIST

MAIN CHASSIS

Symbol Number	Parts No.	Description
		DIODE
D2101, D2103~2105	21015550	Silicon Diode 1S1555
D2102	21090130	" " U05B
		RESISTOR
R2105	40143561	Carbon Film ¼ VJ 560Ω
R2104	40143332	" " " " 3.3KΩ
R2101	42124100	" Composition ½ GK 10Ω
R2102	42124101	" " " " 100Ω
R2106	42124220	" " " " 22Ω
R2107, 2108	42124470	" " " " 47Ω
		POTENTIOMETER
VR2105	49800066	EVHB0AR 10B13 1KΩB
VR2101	49800094	EVKA2AR 15313 5KB/1KB
VR2102	49800095	EVHB0AK 30B54 50KB
VR2103	49800096	EVHB0AK 30B14 10KB
VR2104	49800097	EVAL04DA AB54 50KB
		CAPACITOR
C2104, 2123, C2124 2125	30820103	Ceramic 50WV 0.01μF
C2101~2103, C2105, 2106	30820473	" " 0.047μF
C2108~2122	32821102	Ceramic Feed Thru ECK-Y1H
C2107	35220108	Electrolytic 16WV 1000μF
		METER
M2101 (R2103)	74000360	AP-140 (with Shunt Resistor)
		SPEAKER
SP2101	76000019	SA-92 4Ω 3W
		RELAY
RLS2102	70000002	MX-2P
RSL2101	70000013	AE3244
		RELAY SOCKET
RLS2102	69000003	PX-08
RLS2101	69000006	AE3840
		SWITCH
S2101	64000052	8H2011
S2102 (a) (b)	61000480	BS 2-4-5 (a) (b)
		PLUG
P2102	67020007	SQ4052
		CONNECTOR
J2101	68000011	MBR-06D
J2102~2104	68020013	SG-8018
J2108	68040003	FM144S
J2105	68050003	D5-701B-00
J2106	68060004	QMS-AB6M
		FUSE HOLDER
FH2101	69000007	F3265
		FUSE LAMP
PL2101	14000027	14V BF311-04071A
		TERMINAL BOARD
TB2103	90030001	1L4P 3-0-1
TB2102	90030002	1L5P 3-0-2
TB2101	92000002	1L3P 1-0-2
	96000103	Speaker Cord #240030-1
	55003057	INDUCTOR #220034

SW BOARD

Symbol Number	Parts No.	Description
PB-1635A	60416351	Printed Circuit Board
	016351AZ	PCB with Components
		RESISTOR
R1601	40183223	Carbon Film 1/8W VJ 2.2KΩ
		SWITCH
S1602	64000101	Lever Switch SLE62301
S1601, 1603	64000102	" " SLE64301
	91100008	Wrapping Terminal C

RESISTOR BOARD

Symbol Number	Parts No.	Description
PB-1656	60416560	Printed Circuit Board
	016560AZ	PCB with Components
		RESISTOR
R1704	40143392	Carbon Film ¼W VJ 3.9KΩ
R1703	40143103	" " " 10KΩ
R1702	40143183	" " " 18KΩ
R1701	40143333	" " " 33KΩ
		POTENTIOMETER
VR1701	49905473	SR-19R 47KB
	91100008	Wrapping Terminal C

LAMP BOARD

Symbol Number	Parts No.	Description
PB-1665A	60416651	Printed Circuit Board
	016651AZ	PCB with Components
		LAMP
PL1801~1804	14000015	BQ041-32404A 12V 40mA

RF MOTHER BOARD

Symbol Number	Parts No.	Description
PB1634B	60416342	Printed Circuit Board
	016342AZ	PCB with Components
		FET
Q1901	22890017	FET JF1033B
		DIODE
D1901	21015550	Silicon Diode 1S1555
		CRYSTAL
X1901 (40m)	71800096	HC-18/U 21.5MHz
X1902 (20m)	71800097	HC-18/U 28.5MHz
X1903 (15m)	71800098	" 35.5MHz
X1904 (10mB)	71500175	HC-25/U 43.0MHz
(10mA)	71500174	" (OPTION) 42.5MHz
(10mC)	71500176	" (") 43.5MHz
(10mD)	71500177	" (") 44.0MHz
		RESISTOR
R1907	40143330	Carbon Film ¼ VJ 33Ω
V1908	40143680	" " " " 68Ω
R1903, 1909	40143101	" " " " 100Ω
R1904	40143221	" " " " 220Ω
R1902	40143331	" " " " 330Ω
R1905, 1906	40143102	" " " " 1KΩ
R1911	40143103	" " " " 10KΩ
R1910	40143223	" " " " 22KΩ
R1901	40143333	" " " " 33KΩ
R1913	40143224	" " " " 220KΩ
		VARIABLE CAPACITOR
VC1901	39000074	C343C 121A
		CAPACITOR
C1903, 1907, C1909, 1910, C1917	30820103	Ceramic 50WV 0.01μF
C1908	30820473	" " 0.047μF
C1919	33821050	Dipped Mica " 5PF
C1916, 1918	33824100	" " " 10PF
C1906	33824180	" " " 18PF
C1915, 1905	33824470	" " " 47PF
C1904	33824820	" " " 82PF
C1914	33824251	" " " 250PF
C1911	33824391	" " " 390PF
C1902, 1913	33824431	" " " 430PF
C1912	33824651	" " " 650PF
		TRIMMER CAPACITOR
TC1902~1904	39000001	ECV-1ZW 10x32
TC1901	39000003	" 30x32
		TRANSFORMER
T1901	54165870	R12-6587 #220017
T1902	55003236	#220262
T1903	55003237	#220263
T1904	55003238	#220264
T1905	55003239	#220265
T1906, 1907	55003240	#220279
T1908, 1909	55003241	#220280
T1910, 1911	55003242	#220281
T1912, 1913	55003243	#220282
T1914, 1915	55003244	#220283
T1916, 1921	55003245	#220284
T1917, 1922	55003246	#220285
T1918, 1923	55003247	#220286
T1919, 1924	55003248	#220287
T1920, 1925	55003249	#220288
		SWITCH
S1901~1915	61000470	Band Switch 9-15-5
		CRYSTAL SOCKET
	69010012	SD0105 (HC-25/U 1P)
	91000008	Wrapping terminal
	91100010	Digi Klip (10x7)
	80037621	VC Holder #003762

IF MOTHER BOARD

Symbol Number	Parts No.	Description
PB1628	60416280	Printed Circuit Board
	016280AZ	PCB with Components
		CAPACITOR
C2001	30820103	Ceramic 50WV 0.01μF
C2002	30820473	" " 0.047μF
C2003	36825104	Mylar Film " 0.1μF
	91100008	Wrapping terminal C
	91100010	Digi klip 16x6

RF-MARKER UNIT

Symbol Number	Parts No.	Description
PB-1636	60416360	Printed Circuit Board
	016360AZ	PCB with Components
		IC. FET & TRANSISTOR
Q103	25000108	IC 34024CP
Q104	23800401	FET 3SK40M
Q101, 102	22303724	Transistor 2SC372Y
		DIODE
D102	21015550	Silicon Diode 1S1555
D101	21090115	Gerumanium 1N60
		CRYSTAL
X101	71800108	HC-18/U 12.8MHz

Symbol Number	Parts No.	Description
		RESISTOR
R112	40143330	Carbon Film ¼W VJ 33Ω
R107	40143101	” ” ” ” 100Ω
R108	40143151	” ” ” ” 150Ω
R103, 105	40143102	” ” ” ” 1KΩ
R109	40143182	” ” ” ” 1.8KΩ
R101	40143103	10KΩ
R102	40143223	22KΩ
R111, 113, 114	40143104	100KΩ
R110	40143154	150KΩ
R104	40143224	220KΩ
R106	40143105	1MΩ
		CAPACITOR
C108	31829100	Ceramic 50WV SL 10PF
C104	31820221	” ” CH 220PF
C105~C107, C112, 113, 115	30820103	” ” 0.01μF
C103, 109	30820473	” ” 0.047μF
C101, 114	33824230	Dipped Mica ” 22PF
C110	33824101	” ” ” 100PF
C102	33824221	” ” ” 220PF
		TRIMMER CAPACITOR
TC101	39000007	ECVIZW 20x40
		INDUCTOR
L101	53010003	Micro Inductor 250μH
L102	53020001	” ” 1mH

MIX UNIT

Symbol Number	Parts No.	Description
PB1631B	60416312	Printed Circuit Board
	016312AZ	PCB with Components
		FET & TRANSISTOR
Q202	23800401	FET 3SK40M
Q201	22305351	Transistor 2SC535A
		DIODE
D201, 202, 207, D208	21015550	Silicon Diode 1S1555
D203~206	21090134	Schottky barier 1SS16
		RESISTOR
R207	40143120	Carbon Film ¼ VJ 12Ω
R202, 215	40143101	” ” ” ” 100Ω
R206, 208, 213	40143151	” ” ” ” 150Ω
R201	40143331	” ” ” ” 330Ω
R216	40143182	” ” ” ” 1.8KΩ
R205	40143332	” ” ” ” 3.3KΩ
R203, 209	40143472	” ” ” ” 4.7KΩ
R204	40143562	” ” ” ” 5.6KΩ
R210	40143103	” ” ” ” 10KΩ
R212	40143333	” ” ” ” 33KΩ

Symbol Number	Parts No.	Description
		CAPACITOR
C203, 206, 207, C209~C212, 214	30820103	Ceramic .50WV 0.01μF
C213	33824050	Dipped Mica ” 5pF
C204, 205, 208	33824101	” ” ” 100PF
C201, 202	33824241	” ” ” 240PF
		INDUCTOR
L202, 203	53020001	Micro Inductor 1mH
L201	53020012	” ” 1.2μH
		TRANSFORMER
T201	55003232	#220278
T202	55003233	#220277

FILTER UNIT

Symbol Number	Parts No.	Description
PB-1626B	60416262	Printed Circuit Board
	016262AZ	PCB wth Components
		FET & TRANSISTOR
Q301, 302	22800195	FET 2SK19GR
Q304	23800401	” 3SK40M
Q303	22390001	Transistor MPSA13
		DIODE
D301	21010070	Germanium Diode 1S1007
D302, 303	21090115	” ” 1N60
		MONOLITHIC FILTER
XF301	71200018	9M20A
		CRYSTAL FILTER
XF302	71000010	XF90A
		RESISTOR
R301, 305, 306, R310, 320, 321	40143101	Carbon Film ¼ VJ 100Ω
R304	40143221	” ” ” ” 220Ω
R309	40143561	” ” ” ” 560Ω
R307, 311, 313, R314	40143102	” ” ” ” 1KΩ
R312	40143122	” ” ” ” 1.2KΩ
R	40143222	” ” ” ” 2.2KΩ
R302	40143332	” ” ” ” 3.3KΩ
R322, 324, 325	40143103	” ” ” ” 10KΩ
R308	40143153	” ” ” ” 15KΩ
R323	40143333	” ” ” ” 33KΩ
R316	40143104	” ” ” ” 100KΩ
R317	40143225	” ” ” ” 2.2MΩ
		CAPACITOR
C311	30829510	Ceramic 50WV SL 51PF
C309	30820102	” ” 0.001μF

Symbol Number	Parts No.	Description
C301~303, C306~308, C310, 312, C315~319	30820103	Ceramic 50WV 0.01μF
C304	36526334	Tantalum 50WV 0.33μF
C313	36226335	” ” 3.3μF
C305	34220106	Electrolytic 16WV 10μF
		INDUCTOR
L301	53020001	Micro Inductor 1mH
		TRANSFORMER
T301, 303, 305	55003234	#220275
T304	55003235	#220276
T302	54141710	R12-4171 #220141

IF UNIT

Symbol Number	Parts No.	Description
PB-1625B	60416252	Printed Circuit Board
	016252AZ	PCB with Components
		FET & TRANSISTOR
Q403, 40	28900195	FET 2SK19GR
Q401, 402	23800401	” 3SK40M
Q407	22106281	Transistor 2SA628A
Q405, 406	22303724	” 2SC372Y
		DIODE
D401~403	21015550	Silicon Diode 1S1555
		CRYSTAL
X401	71800107	HC-18/U 8999.3KHz
		RESISTOR
R415	40143479	Carbon Film ¼ VJ 4.7Ω
R435	40143100	” ” ” ” 10Ω
R432	40143820	” ” ” ” 82Ω
R407, 414, 416, R418, 431, 434, 436	40143101	” ” ” ” 100Ω
R406, 413, 420	40143151	” ” ” ” 150Ω
R417	40143331	” ” ” ” 330Ω
R422	40143471	” ” ” ” 470Ω
R430	40143681	” ” ” ” 680Ω
R423	40143102	” ” ” ” 1KΩ
R429	40143182	” ” ” ” 1.8KΩ
R425, 433	40143222	” ” ” ” 2.2KΩ
R421, 426, 427, R428	40143103	” ” ” ” 10KΩ
R403, 410	40143223	” ” ” ” 22KΩ
R401, 402, 408, R409	40143563	” ” ” ” 56KΩ
R405, 412, 419, R424	40143104	” ” ” ” 100KΩ
R404, 411	40143124	” ” ” ” 120KΩ
		POTENTIOMETER
VR401	49917501	V8K 1-1 500Ω

Symbol Number	Parts No.	Description
		CAPACITOR
C401, 407	31820101	Ceramic 50WV 100PF(CH)
C404, 405, C408~410, 414, C418, 421~423, C426, 428	30820103	” ” 0.01μF
C402, 403, 406, C412, 429~431	30820473	” ” 0.047μF
C419	33824100	Dipped Mica 50WV 10PF
C411	33824120	” ” ” 12PF
C415	33824390	” ” ” 39PF
C425	33824470	” ” ” 47PF
C420	33824101	” ” ” 100PF
C417	33824121	” ” ” 120PF
C416	33824271	” ” ” 270PF
C427	36226225	Tantalum 16WV 2.2μF
C424	36226475	” ” 4.7μF
C413	34826476	Electrolytic 50WV 47μF
		TRIMMER CAPACITOR
TC401	39000007	ECVIZW 20x40
		INDUCTOR
L401	53010002	Micro Inductor 22μH
L404, 405	53010003	” ” 250μH
L402, 403	53020001	” ” 1mH
		TRANSFORMER
T401	54141700	R12-4170 #220140
T402	54141710	R12-4171 #220141

MOD/DEM UNIT

Symbol Number	Parts No.	Description
PB-1624B	60416242	Printed Circuit Board
	016242AZ	PCB with Components
		FET & TRANSISTOR
Q501	22800194	FET 2SK19Y
Q502, 503	22303724	Transistor 2SC372Y
		DIODE
D501~504, D509~512	21010070	Germanium Diode 1S1007
D505~508	21015550	Silicon Diode 1S1555
		CRYSTAL
X501	71800094	HC-18/U 8998.5KHz
X502	71800095	HC-18/U 9001.5KHz
		RESISTOR
R506, 510, 514	40143101	Carbon Film ¼ VJ 100Ω
R502, 515, 516	40143151	” ” ” ” 150Ω
R501, 503, 513	40143331	” ” ” ” 330Ω
R505	40143471	” ” ” ” 470Ω
R508, 509, 518	41143471	” ” ¼ TJ 470Ω
R507	40143102	” ” ¼ VJ 1KΩ
R504, 511, 512	40143103	” ” ” ” 10KΩ
R517	40143104	” ” ” ” 100KΩ

		POTENTIOMETER
VR501	49912501	V10K 8-1-2 500Ω
VR502	49917501	V8K 1-1 500Ω
		CAPACITOR
C504, 505	31820101	Ceramic 50WV CH 100PF
C501, 502, C506~510, C513, 516, 517, C520, 522	30820103	" " 0.01μF
C518, 519	36825104	Mylar " 0.1μF
C521	33824240	Dipped Mica " 24PF
C522, 512, 511	33824270	" " " 27PF
C503	33824390	" " " 39PF
C523	33824470	" " " 47PF
C514	33824151	" " " 150PF
C515	33824471	" " " 470PF
		TRIMMER CAPACITOR
TC502~504	39000007	ECV1ZW 20x40
TC501	39000008	" 50x40
		INDUCTOR
L501~505	53020001	Micro Inductor 1mH
L506	53020030	" " 68mH
		TRANSFORMER
T501	54141710	R12-4171 #220141
		RELAY
RL501	70000034	BR211 AD 009M DC9V

AF UNIT

Symbol Number	Parts No.	Description
PB1648A	60416481	Printed Circuit Board
	016481AZ	PCB with Components
		IC & TRANSISTOR
Q601	25000134	IC TA7063P
Q603	25000162	" TA7205AP
Q602	22310005	Transistor 2SC1000GR
		DIODE
D601	21015550	Silicon Diode 1S1555
		RESISTOR
R605, 612	40143331	Carbon Film ¼ VJ 330Ω
R607	40143391	" " " " 390Ω
R608	40143561	" " " " 560Ω
R618	40143681	" " " " 680Ω
R619	40143102	" " " " 1KΩ
R614	40143222	" " " " 2.2KΩ
R615	40143272	" " " " 2.7KΩ
R613	40143332	" " " " 3.3KΩ
R601	40143472	" " " " 4.7KΩ
R611	40143562	" " " " 5.6KΩ
R604, 609, 616	40143103	" " " ' 10KΩ

R606, 617	40143153	Carbon Film ¼ VJ 15KΩ
R603	40143393	" " " " 39KΩ
R610	40143563	" " " " 56KΩ
R602	40143154	" " " " 150KΩ
		CAPACITOR
C625	30820473	Ceramic 50WV 0.047μF
C609	36825222	Mylar " 0.0022μF
C607	36825472	" " 0.0047μF
C601, 613, 616, C621	36825473	" " 0.047μF
C624	36825104	" " 0.1μF
C610	34220105	Electrolytic 16WV 1μF
C605	34220225	" " 2.2μF
C608, 611, 612	34220106	" " 10μF
C618	34220226	" " 22μF
C622	34220476	" " 47μF
C604, 606, 614, C619, 626	34220107	" " 100μF
C617, 623	33824500	Dipped Mica 50WV 50PF
C603	33824271	" " " 270PF
C620	33824391	" " " 390PF
		HEAT SINK
	80019512	001951A

REG CONT UNIT

Symbol Number	Parts No.	Description
PB-1622B	60416222	Printed Circuit Board
	016222AZ	PCB with Components
		IC. FET & TRANSISTOR
Q703	26000023	IC μPC14308
Q704	22800194	FET 2SK19Y
Q701, 702	22303724	Transistor 2SC372Y
Q705	22307354	" 2SC735Y
		DIODE
D702~704	21015550	Silicon Diode 1S1555
D701	21090115	Germanium 1N60
		RESISTOR
R713	40143101	Carbon Film ¼ VJ 100Ω
R716	40143681	" " " " 680Ω
R706, 711	40143102	" " " " 1KΩ
R710	40143222	" " " " 2.2KΩ
R705	40143392	" " " " 3.9KΩ
R701, 702, 708	40143472	" " " " 4.7KΩ
R703	40143562	" " " " 5.6KΩ
R717	40143103	" " " " 10KΩ
R709	40143153	" " " " 15KΩ
R704	40143223	" " " " 22KΩ
R707	40143473	" " " " 47KΩ
R712	40143104	" " " " 100KΩ
R714	42143475	Carbon Composition ¼ GK 4.7MΩ

		THERMISTOR
TH701	29090001	SDT-250
		POTENTIOMETER
VR701	49912103	V10K 8-1-2 10KΩ
VR702	49912205	V10K " 2MΩ
		CAPACITOR
C706, 707, 709, C716	30820103	Ceramic 50WV 0.01μF
C717	30820473	" " 0.047μF
C713, 715	36825103	Mylar Film " 0.01μF
C701~703	36825223	" " " 0.022μF
C710	34526684	Tantalum 35WV 0.68μF
C714	34220105	Electrolytic 16WV 1μF
C708, 712	34220106	" " 10μF
C711	34220107	" " 100μF
C705	34220225	" " 2.2μF
C704	34220475	" " 4.7μF
		RELAY
RL701	70000031	BR211AD012M DC12V
		HEAT SINK
	80019512	B 001951A

NB UNIT

Symbol Number	Parts No.	Description
PB-1627A	60416271	Printed Circuit Board
	016271AZ	PCB with Components
		FET & TRANSISTOR
Q805	22800194	FET 2SK19Y
Q807	22800195	FET 2SK19GR
Q801~804	23800401	" 3SK40M
Q806	22303724	Transistor 2SC372Y
		DIODE
D801~804	21090115	Germanium 1N60
		CRYSTAL
X801	71800093	HC-18/U 8545kHz
		RESISTOR
R817	40143100	Carbon Film ¼W VJ 10Ω
R806, 811, 816, R824	40143101	" " " " 100Ω
R804, 815, 823	40143151	" " " " 150Ω
R810	40143331	" " " " 330Ω
R826, 828	40143102	" " " " 1KΩ
R814	40143222	" " " " 2.2KΩ
R805	40143562	" " " " 5.6KΩ
R818, 820	40143103	" " " " 10KΩ
R827	40143183	" " " " 18KΩ
R821	40143223	" " " " 22KΩ
R808	40143333	" " " " 33KΩ
R813	40143823	" " " " 82KΩ

R801~803, 807, R809, 812, R822, 825	40143104	Carbon Film ¼W VJ 100KΩ
R819, 829	40143334	" " " " 330KΩ
		CAPACITOR
C821	31820120	Ceramic 50WV CH 12PF
C813	31820240	" " 24PF
C823	31820510	" " 51PF
C801, 806, 807, C824	31820101	" " 100PF
C810	31820271	" " 270PF
C802~805, 808, C809, 812, 814, C815, 819, 820, C822, 825, 827	30820103	" " 0.01μF
C811	30820473	" " 0.047μF
C816	33824470	Dipped Mica " 47PF
C818	33824121	" " " 120PF
C817	33824271	" " " 270PF
C826	36226106	Tantalum 16WV 10μF
		INDUCTOR
L802	53010002	Micro Inductor 22μH
L801, 803	53020001	" " 1mH
		TRANSFORMER
T801, 804	54140970	R12-4097 #220101
T802, 803	54141700	R12-4170 #220140

PRE MIX UNIT

Symbol Number	Parts No.	Description
PB1630B	60416302	Printed Circuit Board
	016302AZ	PCB with Components
		IC. FET & TRANSISTOR
Q901	25000101	IC MC1496G
Q902	22800195	FET 2SK19GR
Q903	22307842	Transistor 2SC784R
Q904	22390006	" 2N4427
		RESISTOR
R921	40143100	Carbon Film ¼ VJ 10Ω
R905	40143560	" " " " 56Ω
R922	40143151	" " " " 150Ω
R917	40143221	" " " " 220Ω
R914	40143681	" " " " 680Ω
R901~903, 911, R919, 920	40143102	" " " " 1KΩ
R908	40143122	" " " " 1.2KΩ
R907	40143182	" " " " 1.8KΩ
R909, 918	40143222	" " " " 2.2KΩ
R916	40143472	" " " " 4.7KΩ
R904, 906, 910	40143103	" " " " 10KΩ
R913	40143153	" " " " 15KΩ
R915	40143223	" " " " 22KΩ
R912	40143273	" " " " 27KΩ

Symbol Number	Parts No.	Description
		POTENTIOMETER
VR901	49917103	V8K 1-1 10KΩ
		CAPACITOR
C901~908, C911~914, 917, C918	30820103	Ceramic 50WV 0.01μF
C915	30820473	” ” 0.047μF
C909, 910	31820101	” ” CH 100PF
C916	33824241	Dipped Mica ” 240PF
		INDUCTOR
L902, 903	53010003	Micro Inductor 250μH
L901, 904	53020001	” ” 1mH
		TRANSFORMER
T901	55003231	#220269
		FERRATE BEADS
FB901	56000024	4A-R1 3x3x1H

PRE DRIVE UNIT

Symbol Number	Parts No.	Description
PB-1632B	60416322	Printed Circuit Board
	016322AZ	PCB with Components
		IC. FET & TRANSISTOR
Q1003	25000114	IC MC14011BCP
Q1001	22800195	FET 2SK19GR
Q1004	22303730	Transistor 2SC373
Q1002	22390006	” 2N4427
		DIODE
D1001	21015550	Silicon Diode 1S1555
D1002	21090034	Zener ” WZ090
		RESISTOR
R1005, 1009	40143100	Carbon Film ¼ VJ 10Ω
R1010	40143151	” ” ” ” 150Ω
R1011	41143221	” ” ¼ TJ 220Ω
R1003	40143391	” ” ¼ VJ 390Ω
R1007	40143102	” ” ” ” 1KΩ
R1008	40143182	” ” ” ” 1.8KΩ
R1004	40143222	” ” ” ” 2.2KΩ
R1001	40143332	” ” ” ” 3.3KΩ
R1012, 1014	40143103	” ” ” ” 10KΩ
R1015	40143123	” ” ” ” 12KΩ
R1013	40143333	” ” ” ” 33KΩ
R1002	40143104	” ” ” ” 100KΩ
R1006	42184101	Carbon Composition 18 GK 100Ω
		CAPACITOR
C1004	31820101	Ceramic 50WV CH 100PF
C1002, 1008	30820102	” ” 0.001μF

Symbol Number	Parts No.	Description
C1001, 1003, C1007, 1013, C1014	30820103	Ceramic 50WV 0.01μF
C1005, 1009, C1010	30820473	” ” 0.047μF
C1006	33824241	Dipped Mica ” 240PF
C1012	36226684	Tantalum 16WV 0.68μF
C1011	34220226	Electrolytic ” 22μF
		INDUCTOR
L1001	53020001	Micro Inductor 1mH
		TRANSFORMER
T1001	55003176	#220210
		FERRATE BEADS
FB1001, 1002	56000024	4A-RI 3x3-1H

FIX UNIT

Symbol Number	Parts No.	Description
PB-1629B	60416292	Printed Circuit Board
	016292AZ	PCB with Components
		TRANSISTOR
Q1101, 1102	22303724	Transistor 2SC372Y
		RESISTOR
R1105, 1106	40143101	Carbon Film ¼ VJ 100Ω
R1103	40143102	” ” ” ” 1KΩ
R1101	40143103	” ” ” ” 10KΩ
R1104	40143223	” ” ” ” 22KΩ
R1102	40143333	” ” ” ” 33KΩ
		CAPACITOR
C1108	31820100	Ceramic 50WV CH10PF
C1109	31820150	” ” ” 15PF
C1110~1112	30820103	” ” 0.01μF
C1101~1105	33824150	Dipped Mica ” 15PF
C1106	33824151	” ” ” 150PF
C1107	33824301	” ” ” 300PF
C1113, 1115	33824471	” ” ” 470PF
C1114	33824821	” ” ” 820PF
		TRIMMER CAPACITOR
TC1101~1105	39000009	ECV1ZW 50x40
		INDUCTOR
L1101	53020001	Micro Inductor 1mH
L1102, 1103	53020014	” ” 1.8μH
		CRYSTAL SOCKET
	69010012	SD0105

		TERMINAL
	90000000	1P Lighthouse Type
	91100003	TP-B

VFO UNIT (3310)

Symbol Number	Parts No.	Description
PB-1440A-3310	60414401	Printed Circuit Board
	014401AZ	PCB with Components
		FET & TRANSISTOR
Q1202	22800195	FET 2SK19GR
Q1201, 1203	22303724	Transistor 2SC372Y
		DIODE
D1202	21015550	Silicon Diode 1S1555
D1201	21022360	Varactor " 1S2236
		RESISTOR
R1210, 1211	40143101	Carbon Film ¼W VJ 100Ω
R1207	40143221	" " " " 220Ω
R1212	40143471	" " " " 470Ω
R1205, 1208	40143222	" " " " 2.2KΩ
R1202	40143332	" " " " 3.3KΩ
R1201	40143103	" " " " 10KΩ
R1203	40143183	" " " " 18KΩ
R1204	40143333	" " " " 33KΩ
R1206, 1209	40143104	" " " " 100KΩ
		CAPACITOR
C1203	31827150	Ceramic 50WV UJ 15 PF
C1201	31827080	" " " 8PF
C1204	31820150	" " CH 15PF
C1205	31820390	" " " 39PF
C1208, 1210, C1211, 1215, C1217, 1218	30820103	" " 0.01μF
C1206, 1222	30820473	" " 0.047μF
C1207	33824080	Dipped Mica " 8PF
C1209, 1214, C1216	33824330	" " " 33PF
C1212	33824181	" " " 180PF
C1213	33824431	" " " 430PF
C1219, 1221	33824471	" " " 470PF
C1202, 1220	33824102	" " " 1000PF
C1224, 1225	32821102	Feed Thru " 0.001μF
		VARIABLE CAPACITOR
VC1201	39000027	C521A112B
		TRIMMER CAPACITOR
TC1202	39000005	ECV-1ZW 50x32
TC1201	39000070	TSN-100D15
		INDUCTOR
L1201	53003184	#220268
L1205, 1206	53020014	Micro Inductor 1.8μH
L1202, 1203	53010003	" " 250μH
L1204	53020001	" " 1mH
		RECEPTACLE
J1201	67020001	CN3561

10WPA UNIT (3310)

Symbol Number	Parts No.	Description
PB-1443-3310	60414430	Printed Circuit Board
	014430AZ	PCB with Components
		TRANSISTOR
Q1301	22315890	Transistor 2SC1589
Q1302, 1303	22390009	" MRF433
		DIODE
D1302, 1303	21090019	Silicon Diode 10D10
D1301	21009930	" " YZ033
		RESISTOR
R1305	42124479	Carbon Composition ½W GK 4.7Ω
R1308, 1309	42124150	" " " " 15Ω
R1303	42124220	" " " " 22Ω
R1307	42124390	" " " " 39Ω
R1310, 1311	42124101	" " " " 100Ω
R1302	42124331	" " " " 330Ω
R1301	42124391	" " " " 390Ω
R1306	42124821	" " " " 820Ω
R1304	43204680	Metalized Film 2W 68Ω
		CAPACITOR
C1311	30830102	Ceramic 500WV 0.001μF
C1312	30830472	" " 0.0047μF
C1308	30820103	" 50WV 0.01μF
C1301, 1302, C1304, 1306, C1309, 1310	30820473	" " 0.047μF
C1315	30825105	" Chip " 0.1μF
C1316	33834510	Dipped Mica 500WV 51PF
C1313, 1314	36825224	Mylar 50WV 0.22μF
C1307	34220105	Electrolytic 16WV 1μF
C1303, 1305	34220336	" " 33μF
		INDUCTOR
L1301, 1302	55003053	RFC #220032
		TRANSFORMER
T1301	55003051	T1301 #220024
T1302	55003224	T1301 #220289
	80037583	Heat Sink 003758B

LPF UNIT

Symbol Number	Parts No.	Description
PB-1636A	60416361	Printed Circuit Board
	016361AZ	PCB with Components

		CAPACITOR
C1418	33834200	Dipped Mica 500WV 20PF
C1414	33834250	” ” ” 25PF
C1410	33834400	” ” ” 40PF
C1406	33834820	” ” ” 82PF
C1413, 1416, C1417, 1420	33834101	” ” ” 100PF
C1402, 1409, C1412, 1419	33834151	” ” ” 150PF
C1415	33834181	” ” ” 180PF
C1411	33834271	” ” ” 270PF
C1405, 1408	33834301	” ” ” 300PF
C1407	33834561	” ” ” 560PF
C1401, 1404	33834621	” ” ” 620PF
C1403	33834102	” ” ” 1000PF
		INDUCTOR
L1401, 1402	55003226	#220270
L1403, 1404	55003227	220271
L1405, 1406	35003228	220272
L1407, 1408	55003229	220273
L1409, 1410	55003230	220274
	91100008	Wrapping Terminal C


ALC UNIT

Symbol Number	Parts No.	Description
PB-1637	60416370	Printed Circuit Board
	016370AZ	PCB with Components
		DIODE
D1501~1504	21010070	Gerumanium Diode 1S1007
		RESISTOR
R1502	40143820	Carbon Film ¼W VJ 82Ω
R1503	40143102	” ” ” ” 1KΩ
R1501	40143563	” ” ” ” 56KΩ
		POTENTIOMETER
VR1501	49905103	SR19R 10KB
		CAPACITOR
C1501, 1502, C1504, 1505	30820103	Ceramic 50WV 0.01μF
C1503	30820473	” ” 0.047μF
C1506	33834561	Dipped Mica 500WV 560PF
		TRIMMER CAPACITOR
TC1501	39000001	ECV1ZW 10x32
		INDUCTOR
L1501	53020001	1mH

		TRANSFORMER
T1501	55003225	CM Coupler #220027
	91100008	Wrapping Terminal C

ACCESSORIES

Symbol Number	Parts No.	Description
	77000008	Microphone Assembly YE-7A with Microphone Hanger Screws
	67040001	Microphone Plug FM-144P
	96000180	Power Cord Assembly #240053
	68060012	Power Plug QMS-P6FK
	69000002	Fuse Holder SN-1102
	73000010	Fuse 6A
	73000010	Spare Fuse 6A
	80037871	Mobile Bracket with Screw
	67020005	Coaxial Plug PL-259
	67020003	Phone Plug P-2240
	67030002	Plug Adaptor KA-409



MOD/DEM (PB-1624)
IF UNIT (PB-1625)
NB UNIT (PB-1627)
P/O (PB-1634B)
PRE DRIVE (PB-1632A)
RF MARK UNIT (PB-1633)
10W AMP UNIT (PB-1443)
AF UNIT (PB-1648)
RF GAIN
IC METER SHUNT
CONT UNIT (PB-1622A)
FILTER UNIT (PB-1626B)
MIX UNIT (PB-1631B)
PRE MIX UNIT (PB-1630A)
FIX UNIT (PB-1629)
VFO UNIT (PB-1440A)
LPF UNIT (PB-1636A)
ALC UNIT (PB-1637)
SW UNIT (PB-1635A)
FIX CLAR PB-1665
AF GAIN
MIC GAIN
MIC J
EXT VFO
EXT SP
POWER
POWER SW
EAR J
KEY J
CALIB
CLAR
IC SET
ANT
NOTE
1. ALL REGISTORS IN Ω 1/4W ±10% UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS IN μF UNLESS OTHERWISE NOTED.
FT-7
CIRCUIT DIAGRAM

YAESU